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FOREWORD

Reflections on the Expansion of Metabolic Research

IT IS an unusual privilege to record a few words in the first number of a new journal devoted to clinical and experimental studies in the field of metabolism. The steadily increasing host of investigators in this field are bound to welcome the advent of a medium through which their interchange of ideas and the deposit of new information, gleaned in their laboratories and clinics, can be promoted. The physician who is not an investigator in this field should find it of help in keeping abreast of the many applications to clinical practice, affecting diagnosis, prognosis and therapy in almost every branch of medicine. The fact of this journal's appearance causes one to reflect on the remarkable expansion of the science of metabolism that we are now witnessing. From the narrower confines of nitrogen balance, respiratory quotients, and the laborious analytical methods of the turn of the century, one can now contemplate a broad stream of metabolic research ramifying into every aspect of medicine and biology.

The immense increase in participation in metabolic research, especially in the past decade, is due, no doubt, to the interplay of a great many factors, a few of which stand out in clear relief. The encouragement and support of basic research by government, a factor obviously enlarged by war and rumors of war, has been manifest not only through the grant and contract systems but by the provision of space, facilities, and material as in the various installations of the Veterans Administration, Public Health Service, Armed Forces, and Atomic Energy Commission. The increasing availability of support for investigators at various levels, from Fellow to Professor, by these and many other nongovernmental agencies as well, has been of the utmost significance.

One of the most potent and intensely catalytic factors in the whole forward progress of the science of metabolism has been the utilization of stable and radioactive isotopes in "tracer" studies. An ever-growing company of followers of Schönheimer, who first gave real impetus to this type of research, is rapidly filling in hitherto unapproachable gaps in our knowledge of intermediary metabolism. One of the outstanding examples is found in the classic studies of Shemin and co-workers, which have revealed in such beautiful fashion the manner in which glycine and acetate are used in the construction of the hemoglobin protoporphyrin, a pathway foreshadowed by the purely in vitro syntheses of Hans Fischer.

Research inevitably begets research. As facts accumulate they simply point the way to an increasing number of questions. From Bartholin's dictum of the role of the liver as simply that of a "large dull bile producer," to the recent documentation of 500 functions, which admittedly is only the beginning, is almost a *reductio ad absurdum*, but the contrast may serve to emphasize nature's constant provision of new avenues for exploration.

Above all, we must hope and strive to foster attitudes toward research which will be most productive of ideas, and atmospheres in which ideas can be most

thoroughly tested. To anyone who has "burned the midnight oil" in attempting to work out his ideas in the laboratory, it will be apparent that ideas under these circumstances often bud like yeasts, except that here any one of the progeny may far transcend the parent. In this day of relatively abundant support of research, with laboratories and equipment and with teams of chemists, technicians, and professional assistants such as investigators even a decade ago never dreamed of, there is often an unfortunate tendency for the original idea to be relegated for execution to the technical team. Whether this occurs because of administrative pressure or other interferences, the budding process may well be stultified. Funds may even smother ideas, and the scope of a program may be so broad as to confound its best objectives. The young investigator with an idea is generally well advised to nurture it carefully with his own two hands, denying the impulse to seek a large budget for expensive equipment and technical assistance, but first going as far forward as he can on the simplest possible basis. This is a valuable discipline, and it is also a method which has often been richly rewarding, both in tangible results and further ideas.

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